

Stomatal Patterns in the genus Begonia<sup>1</sup>.

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In the study of leaves of several species of Begonia it has been observed that on the lower epidermis various stomatal patterns exist in the genus. This pan-tropic genus is large, consisting of approximately a thousand species distributed among some seventy sections of the genus.

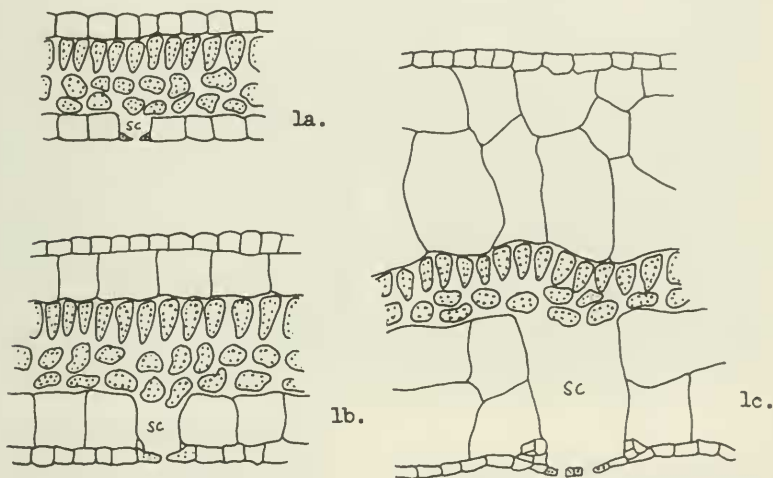


Figure 1. Cross sections of Begonia leaves showing the various types of epidermal layers in the genus and the stomatal chambers (sc).

la. B. evansiana Andrews.

lb. B. paulensis A. DC.

lc. B. acetosa Vellozo.

Scale |——| .1 mm.

<sup>1</sup> The Begonia specimens used in this study were contributed by the Kartuz Greenhouses, Wilmington, Massachusetts.

As Fellerer (1892), Barkley & Boghdan (1968, 1969), and Barkley & Hozid (1971) have recorded, the morphology and anatomy of the Begonia leaf is quite interesting, especially regarding the various types of epidermal layers which occur. The epidermis, depending on the species, can be uniseriate (single upper and lower epidermis), biseriate (double upper and lower epidermis), or multiseriate (with three or more layers of upper and lower epidermis) (Fig. 1).

Another interesting feature of the Begonia leaf morphology, is the various types of stomatal patterns found associated with the lower epidermis. Fellerer (1892) first described the stomata of Begonia and its ontogeny. Payne (1970) described and classified the mesogenous stoma in Begonia as helicocytic (Fig. 2a) and described the ontogeny of this type of stoma. The stomata in Begonia have been observed by the authors to occur in several types

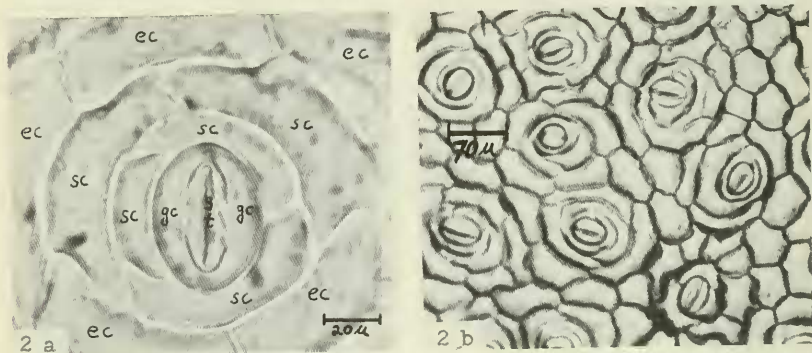


Figure 2. Cellulose acetate impressions of the lower epidermis and stomata of Begonia leaves.

2a. B. purpurea Sweet showing a single stoma (st), guard cells (gc), subsidiary cells (sc) and epidermal cells (ec). X 400.

2b. B. purpurea Sweet showing single stomata separated by epidermal cells. X 100.

2c. B. paulensis A. DC. showing clusters of stomata separated by epidermal cells. X 100.

of patterns. One pattern, the simplest is that with each stoma appearing by itself surrounded by subsidiary cells and separated from other stomata by epidermal cells (Figs. 1a-c). If the stomata occur in clusters (Fig. 2c), the stomatal chamber is as wide as the cluster and as deep as the layers of epidermal cells.

Depending on the species, the leaf may have only stomata occurring singly as illustrated in figures 2a and 2b, or in some species there may be single stomata as well as clustered, compound stomata, or there may be only compound stomata in clusters. Where compound stomata occur, the number of stomata in a cluster may vary somewhat from cluster to cluster on the same leaf.

Table 1 lists the Begonia studied, the taxonomic section of that species, the area where the species is native, its type of epidermis, and the number of stomata per cluster found on the lower surface. As mentioned previously, where stomata are compound, the number of stomata are not constant from cluster to cluster, even in the same species. The table gives the number of stomata observed in clusters for a species, with the predominant type of cluster underlined. In the species observed, not a single one had stomata on the upper surface. Plates 1 and 2 refer to species in Table 1.

Among the Begonia species studied by the authors, there appears to be correlation of stomatal patterns, number of stomata in a cluster, and the type of leaf epidermis of each particular species. Where the upper and lower epidermis is uniseriate, the stomata (with the exception of Begonia goegoensis N. E. Brown) occur as single stoma, while those Begonia with a multicellular epidermis, have the stomata compound in clusters.

## REFERENCES

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TABLE 1. Correlation of stomatal pattern and the type of epidermis in the genus Begonia.

Species	Section	Native of	Type of epidermis	Number of stomata per cluster
<u>B. cathayana</u> Hemsl.	Platycentrum	China	Uniseriate	1
<u>B. rex</u> Putzeys var.	Platycentrum	India	"	1
<u>B. pustulata</u> Liebm.	Weilbachia	Mexico	"	1
<u>B. imperialialis</u> Lemaire	Weilbachia	Mexico	"	1
<u>B. liebmanni</u> A. DC.	Weilbachia	Mexico	"	1
<u>B. goegoensis</u> N. E. Br.	Reichenheimia	Sumatra	"	1, 2, 3
<u>B. acida</u> Vellozo	Pritzelia	Brazil	"	1
<u>B. purpurea</u> Sweet	Begoniastrum	Jamaica	"	1
<u>B. masoniana</u> Irms.	Coelocentrum	Singapore	"	1
<u>B. olsoniae</u> Sm. & Sch.	Pritzelia	Brazil	Biseriate	2, 3, 4, 5, 6
<u>B. paulensis</u> A. DC.	Begoniastrum	Brazil	"	2, 3, 4
<u>B. manni</u> Hook. f.	Tetraphila	Africa	"	1, 2, 3, 4
<u>B. incana</u> Lindl.	Knesebeckia	Mexico	"	1, 2, 3
<u>B. floccifera</u> Bedd.	Reichenheimia	India	Multiseriate	2, 3, 4, 5, 6
<u>B. acetosa</u> Vellozo	Pritzelia	Brazil	"	2, 3, 4, 5
<u>B. venosa</u> Skan	Gireoudia	Brazil	"	4, 5, 6, 7

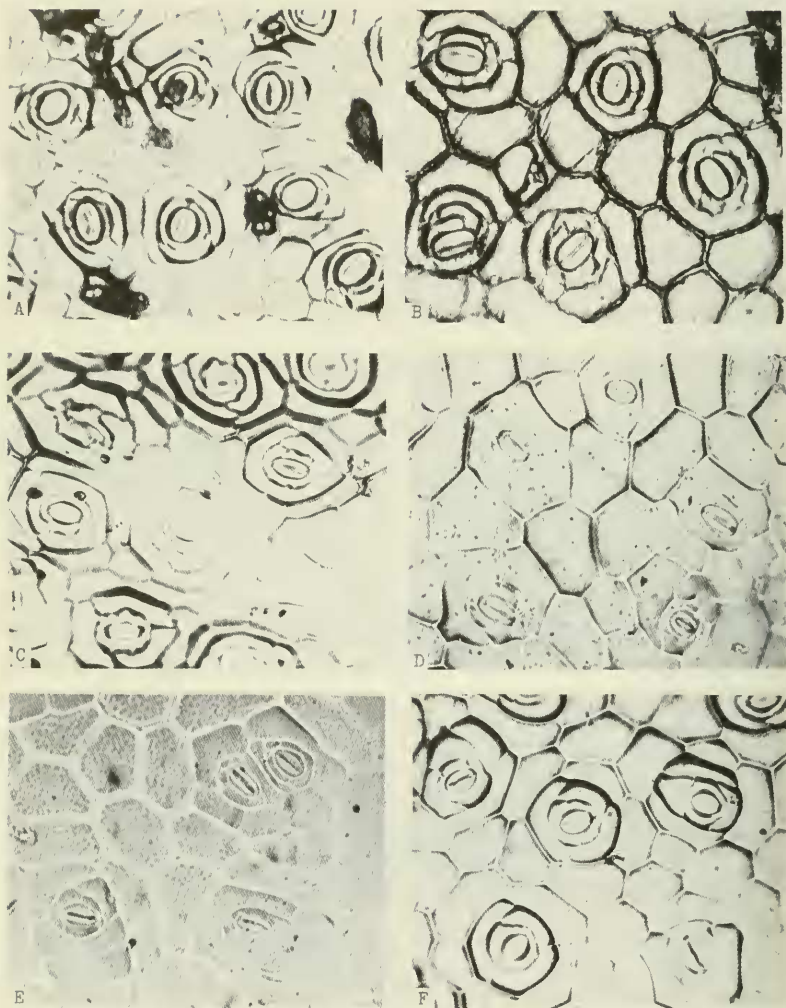


PLATE I. Cellulose acetate impressions of stomata from the lower epidermis of *Begonia* species in which their upper and lower epidermis are uniseriate. (A) *B. cathayana* Hemsley; (B) *B. rex* Putzeys; (C) *B. pustulata* Liebmann; (D) *B. liebmannii* A. DC.; (E) *B. goeogensis* N. E. Brown; (F) *B. masoniana* Irmscher.  $\overline{70\mu}$

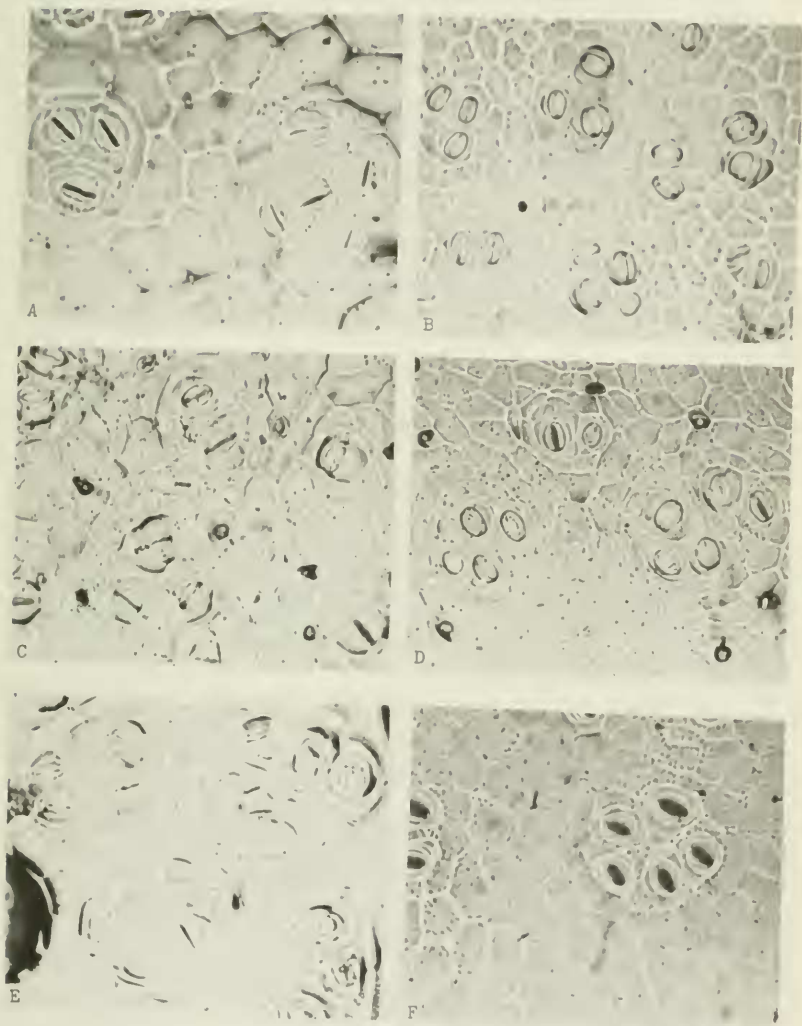


PLATE II. Cellulose acetate impressions of stomata from the lower epidermis of Begonia species having biseriate upper and lower epidermis (A - C; figure 2 c), and having multiseriate epidermis (D - F). (A) B. olsoniae Smith & Schubert; (B) B. manni Hooker f.; (C) B. incana Lindley; (D) B. floccifera Beddome; (E) B. acetosa Vellozo; (F) B. venosa Skan ex Hooker f.  $\overleftarrow{70\mu}$